

Claims

- [c1] A method of forming thin silicon oxide film comprising the steps of:
- providing a silicon carbide substrate;
 - passing an oxidizing gas through an oscillating radio frequency electric field, wherein the gas achieves an excited state of energy; and
 - contacting the substrate with the excited gas.
- [c2] The method of claim 1, wherein the electric field is created by using an afterglow thermal reactor.
- [c3] The method of claim 1, wherein the electric field is created by using a microwave cavity.
- [c4] The method of claim 1, wherein the oxidizing gas is selected from the group consisting of molecular oxygen, atomic oxygen, excited molecular O₂ (singlet delta g state), and nitrogen oxides.
- [c5] The method of claim 1, further comprising the step of maintaining the oxidizing gas at a temperature range between 600°C to 1,200°C.
- [c6] The method of claim 1, further comprising the step of

maintaining the oxidizing gas at a pressure less than 50 torr.

- [c7] The method of claim 6, wherein the pressure is maintained using a vacuum pump.
- [c8] The method of claim 1, wherein the silicon substrate is secured onto a heated zone.
- [c9] A method of forming thin silicon oxide film comprising the steps of:
 - providing a silicon carbide substrate within a tube;
 - passing an oxidizing gas through an oscillating radio frequency electric field, wherein the gas achieves an excited state of energy; and
 - contacting the substrate with the excited gas, wherein the tube is maintained at a temperature range between 600°C to 1200°C, and at a pressure less than 50 torr.
- [c10] A method of forming thin silicon oxide film comprising the steps of:
 - providing a silicon carbide substrate within a tube, wherein the tube is in contact with a furnace, and wherein the tube is connected to a pump;
 - passing an oxidizing gas through an afterglow plasma source, wherein the gas achieves an excited state of energy;

adding a secondary gas to the excited gas; and
contacting the substrate with the excited gas, wherein
the tube is maintained at a temperature between 600°C
to 1200°C by the furnace, and wherein the tube is main-
tained at a pressure less than 50 torr by the pump.